

## NESTING ECOLOGY AND BREEDING SUCCESS OF CHEER PHEASANT *CATREUS WALLICHII* IN GARHWAL HIMALAYA, INDIA<sup>1</sup>

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Nesting ecology and breeding success of the Cheer Pheasant *Catreus wallichii* was studied in Garhwal Himalaya, Uttaranchal from 2000 to 2002. Five active nests were located in May-June and one in September on the south, southwest and northwest aspects, in shallow depressions; hollow pits or below stones, lined with dry pine needles and leaves. The vegetation around the nest was less than the dry litter. Clutch size ranged from 6-12. Hatching success was 71 per cent, but breeding success was less than half the clutch size.

**Key words:** Cheer pheasant, nesting ecology, breeding success, chick survival

### INTRODUCTION

Cheer pheasant *Catreus wallichii* (Hardwicke), is a threatened species (Fuller and Garson, 2000), found in the Himalaya from northwest Pakistan to west-central Nepal between the Indus and Kali-Gandaki rivers (Ali and Ripley 1980; Garson *et al.* 1992). Information on the breeding biology of this pheasant is scarce and mainly derived from accounts of Hume and Marshal (1995) on wild birds, Chandola-Saklani *et al.* (1990) and Singh and Singh (1995) on captive birds.

In this paper the nesting ecology, clutch size, breeding success and associated behaviour of Cheer is described on the basis of six active nests located from year 2000 to 2002 in Garhwal Himalaya, India.

### STUDY AREA AND METHODOLOGY

Cheer Pheasant (called 'Chair or Phaklas/Phakras' in Garhwal Himalaya, Uttaranchal) inhabit steep slopes covered by Chir-pine and pine-mixed forests (*Pinus roxburghii*, *Phyllanthus embellicus*, *Quercus leucotricophora*, *Rhododendron arboreum*, *Myrica nagi*, *Lyonia ovalifolia*) between 1000-2150 m altitudes. During summer months (May-June) their habitats become relatively inaccessible due to accumulation of dry slippery pine needles, grass and leaves. We were, however, successful in locating six active nests at different sites in districts Pauri and Chamoli, Uttaranchal (29° 22' N to 31° 07' N and 78° 07' E to 80° 10' E) during a survey conducted on status and distribution of Cheer in the year 2000-2001 and 2002 (Bisht *et al.* 2002). Information on altitude, aspect, position on ground, distance to escape site (nearest ridge and hiding cover), dimension of nests and vegetational cover was collected for each located nest site. Quadrats

measuring 10 x 10 m were laid at each nest site where canopy cover, shrub cover and grass cover was assessed through an arbitrary index of 1-25, 25-50, 50-75 and 75-100% (De Vos and Mosby 1981). Grass height and litter depth around the nests were also recorded.

Each nest was visited at intervals of 2-3 days, and records were maintained on the number and colour of eggs laid, shape and size of nest, hatching success (total number of eggs laid by total number of chicks hatched), chick survival (total number of chicks hatched by total number of chicks survived up to 8 weeks), breeding success (total number of eggs laid by total number of chicks that survived to adulthood), population survival (total number of adults that survived till the next breeding season) and associated behaviours.

### RESULTS

**Nest site characteristics:** Detailed information is presented in Table 1. The nests were found between altitudes of 1450-1700 m. Of the six nests: two were on the north-west facing slope, two on the southwest slope, one on the southern slope and one on the western slope. The nests were found under the shelter of rocks, in a hollow or pit on the ground. Average distances of nests from the nearest escape sites, namely ridge/cliff and hiding cover were 29.0 ± 14.4 m and 11.5 ± 1.5 m respectively. Diameter and depth of the nests were 24.2 ± 1.6 cm and 9.3 ± 0.8 cm respectively. All nests were made up of dry pine needles, grass and leaves in a shallow depression. The median scores for vegetation cover around the nests were as follows: canopy – 25.0% (inter-quartile range – 18.8), shrub – 12.5% (inter-quartile range – 5.0) and grass cover – 10.0% (inter-quartile range – 0.0). The grass height and litter depth were 17.7 ± 5.5 cm and 10.6 ± 2.2 cm respectively.

The nesting sites were characterised by low grass height and grass cover (except in nest no. V – Table 1). The litter depth was significant during May-June, subsequently depleting during September. The five nests located in May-June were found near the ridge/cliff (10-25 m), however, the nest found in September was far from the ridge (100 m). The grass cover and grass height are positively and significantly correlated to distance of nest from ridge/cliff ( $r=0.989$ ,  $P>0.01$  and  $r=0.960$ ,  $P<0.01$ ) respectively.

**Clutch size and breeding success:** A mean clutch size of  $8.5 \pm 1.0$  eggs was recorded. The eggs were of the size of those of a domestic fowl, and coloured brownish buff-white with reddish brown specks around each end. Eggs from two nests were probably picked up either by villagers or predators. From the remaining four nests, 79% (inter-quartile range – 11.4) eggs were hatched. The chicks were generally dark chestnut in colour.

The hatching success recorded was 70.8% (inter-quartile range – 64.1) with chick survival and breeding success of 53.6% (inter-quartile range – 51.8) and 37.5% (inter-quartile

range – 39.6) respectively. The percentage population survival for the four families recorded before the commencement of the next breeding season was 53.6% (inter-quartile range – 14.1).

**DISCUSSION**

The breeding of Cheer Pheasant in Garhwal Himalaya starts with pairing and territory formation by the end of February. The first courtship display was observed on March 17. During this period the breeding pairs remain in isolation within their home range and are sometimes accompanied by an unpaired sub-adult male from the previous year. The male performs mate guarding while the female feeds. Egg laying generally starts by the first week of May and incubation continues till June. Hatching was observed from mid to end June (16th, 23rd and 26th) after an incubation period of 25-27 days. Sub-adults become apparent by the first week of September and sexual dimorphism is complete by mid-October to November (Hume and Marshall 1995; Ali

**Table 1:** Nesting ecology and breeding success of Cheer Pheasant

Breeding events	Number of nests						Mean $\pm$ SE or Median value
	I	II	III	IV	V	VI	
1. Location of nest							
(a) Altitude (m)	1700	1680	1600	1500	1450	1575	
(b) Aspect	NW	NW	S	SW	SW	W	
(c) On ground	Below stones	In a hollow	In a pit	Below stones	Amidst grass	In a hollow	
2. Distance of nest from escaping site							
(a) ridge (m)	10.0	12.0	25.0	10.0	100.0	17.0	29.0 $\pm$ 14.4
(b) nearest hiding cover (m)	5.0	14.0	15.0	12.5	10.0	12.5	11.5 $\pm$ 1.5
3. Size of nest (cm)							
(a) Diameter	20.3	24.4	21.1	25.9	22.1	31.2	24.2 $\pm$ 1.6
(b) Depth	7.6	11.2	7.6	11.9	7.9	9.4	9.3 $\pm$ 0.8
4. Vegetation cover around nest							
(a) Canopy cover (%)	50.0	25.0	25.0	50.0	25.0	25.0	25.0 (18.8)
(b) Shrub cover (%)	25.0	10.0	15.0	15.0	10.0	10.0	12.5 (5.0)
(c) Grass cover (%)	10.0	10.0	10.0	5.0	90.0	10.0	10.0 (0.0)
(d) Grass height (cm)	15.2	12.7	11.4	6.4	44.5	16.0	17.7 $\pm$ 5.5
(e) Litter depth (cm)	10.2	12.7	15.2	16.5	2.5	6.4	10.6 $\pm$ 2.2
5. Clutch size	8	6*	8	10*	6	12	8.3 $\pm$ 1.0
6. Hatching success (%)	75.00	0.0	87.50	0.0	66.67	83.33	70.8 (64.1)
7. Chick survival (%)	66.70	0.0	57.15	0.0	75.00	50.00	53.6 (51.8)
8. Breeding success (%)	50.00	0.0	50.00	0.0	33.33	41.67	37.5 (39.6)
9. Population survival (%)	40.00	□	50.00	□	75.00	57.14	53.6 (14.1)

\* Eggs were either removed by villagers or predators; □ not recorded; values in the parentheses are inter-quartile ranges

and Ripley 1980). However, locating an active nest at 1500 m altitude in district Chamoli in September 2001, which later produced chicks with breeding success of 33.3%, may indicate an extended breeding season.

The principal source of nesting mortality in Galliform species is predation (Jimenez and Conover 2001). The nest site (with its complexities) is important for nest survival; as it should camouflage the nest from predators. The nests recorded by us had a stone/rock-wall or litter (mostly pine leaves) filled hollow/pit as background, which provided a good camouflage to the incubating hen. The canopy, shrub and grass cover (except in nest no. V) were low while the litter cover and depth were significant. The dulling of the red orbital patch during the breeding season in the females may also be advantageous during incubation. It was observed that the facial patch of the incubating female (while actually on the nest) is concealed by the supercilia and the infra orbital parts, revealing only the eyes, making it almost invisible. However, this red orbital patch becomes noticeable when it leaves the nest for feeding. Though the pre-monsoon in May-June influence invertebrate abundance (necessary for chick survival), it does not affect the litter cover/depth, which aids in making the nest less conspicuous. The monsoon showers usually wash the litter away and promote vegetational growth during July and August.

Five of the six nests were located quite near ridges and cliff, a possible area for escape from predators for though the Cheer runs fast it seldom takes to wing if the ground is open (Hume and Marshall 1879). The presence of hiding cover (5-15 m) near the nest was also advantageous in case the female wanted to seek shelter. The cause of nesting failure of the two nests was predation. Though both nests were located in habitats similar to successful ones, nesting success seemed

to have no significant association with habitat features. This may be credited to high predation or anthropogenic pressures as the nests were exposed due to fire.

Larger nests (diameter) appear to have larger clutch sizes ( $r=0.875$ ,  $N=5$ ,  $P<0.05$ ) [Nest II was excluded as the eggs were exposed to predation (human/potential predators) due to forest fire before a complete clutch was laid.] The clutch size of 6-12 found in the present study is comparatively lower than 9-14 eggs reported earlier (Hume and Marshall 1995). In captivity, an average clutch size of 10.8 eggs/brood, hatching success (average 56%) and chick survival (average 57%) has been recorded (Chandola-Saklani *et al.* 1990).

Chick survival can be related to factors like invertebrate abundance (Hill 1985) and predation pressure. Adult survival is another major factor influencing propagation and dispersal, and is probably affected by excessive hunting during the winter months (Bisht *et al.* 2002).

Cheer can adapt relatively well to high levels of human disturbance (Lelliott 1987). Fires, which may be necessary for maintenance of open grassland and scrub communities, are lit during the egg laying and incubating period. This may disrupt breeding and cause re-nesting (as was witnessed during this study), and along with hunting may be a severe threat to the survival of Cheer in Garhwal. Habitat degradation, therefore, may not be the only cause of depletion of this threatened monotypic species.

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